



**A d v a n c e d   T e s t   &   D i a g n o s t i c   S y s t e m s**

**X** shortform



# TESTING PROTECTIVE RELAY

Protective Relays have a very important role to play in the prevention of damage to equipment like generators, transformers, etc. They are tested with our test sets, in order to perform preventive maintenance and/or analysis after false or missing operation. isa offers advanced testing requirements to assure the correct behaviour of relays installed in networks. Furthermore, our test sets are also suitable for transducers, energy meter and power quality meters.



## DRTS 66 - The new generation of test equipment for Protective Relays, Energy meters, Transducers and Power Quality meters

- Manual control with color display and by laptop with TDMS software.
- Simultaneously available: 6 Current and 6 Voltage plus 1 battery simulator output.
- High current outputs: 6 x 32 A, 3 x 64 A, 1 x 128 A.
- High power outputs: 6 x 430 VA, 3 x 860 VA, 1 x 1000 VA.
- Voltage outputs: 6 x 300V at 100 VA.
- High accuracy outputs: better than 0.05%.
- IEC61850 protocol interface. USB, Ethernet and Pen drive interface.
- IRIG-B interface for end-to-end tests.

## DRTS 64 - The new generation of test equipment for Protective Relays, Energy meters, Transducers and Power Quality meters

- Manual control with color display and by laptop with TDMS software.
- Simultaneously available: 6 Current and 4 Voltage plus 1 battery simulator output.
- High current outputs: 6 x 32 A, 3 x 64 A, 1 x 128 A.
- High power outputs: 6 x 430 VA, 3 x 860 VA, 1 x 1000 VA.
- Voltage outputs: 4 x 300V at 100 VA.
- High accuracy outputs: better than 0.05%.
- IEC61850 protocol interface. USB, Ethernet and Pen drive interface.
- IRIG-B interface for end-to-end tests.



## DRTS 34 - The new generation of test equipment for Protective Relays, Energy meters, Transducers and Power Quality meters

- Manual control with color display and by laptop with TDMS software.
- Simultaneously available: 3 Current and 4 Voltage plus 1 battery simulator output.
- High current outputs: 3 x 32 A, 1 x 96 A.
- High power outputs: 3 x 420 VA, 1 x 1000 VA.
- Voltage outputs: 4 x 300V at 100 VA.
- High accuracy outputs: better than 0.05%.
- IEC61850 protocol interface. USB, Ethernet and Pen drive interface.
- IRIG-B interface for end-to-end tests.



## DRTS 6 - Automatic Relay Test Set

- Multi-tasking automatic test set designed for testing protection relays, energy meters, transducers.
- Outputs: 6 x 15A (80 VA), 4 x 300V (85 VA), 1 x 260 VDC.
- High accuracy: 0,1%, 0.05% (HP).
- Analog measurement inputs.
- IEC61850 Protocol interface.
- USB and RS232 port.
- Controlled by laptop PC or local control by PDA.
- Lightweight: 18 kg.



# TESTING PROTECTIVE RELAY

generators, transformers, busbars, feeders and transmission lines. Relay schemes can be commissioned or modified for various operating conditions. ISA has a complete and wide range of automatic test sets that can fulfill all the basic and advanced requirements. Thanks to the leading edge technology of its test sets, ISA can also provide advanced automatic testing



## DRTS 3 PLUS - Automatic Relay Test Set

- Multi-tasking test set designed for testing protection relays, energy meters, transducers.
- Outputs: 3 x 15 A (100 VA); 4 x 300 V (85 VA); 1 x 260 V DC.
- High accuracy: better than 0,05%.
- Analog measurement inputs.
- IEC61850 Protocol interface.
- USB and RS232 port.
- Controlled by PC laptop or local control by PDA.
- Lightweight: 18 kg.

## RELTEST - Three Phase Relay Test Set

- Advanced multifunctional relay test set, specially designed for distribution, smart grid and renewable energy plants.
- Local control, via keyboard and colored display. Remote control with TDMS Software.
- Three independent AC voltage outputs adjustable from 0 to 400 V.
- Fourth independent AC voltage output adjustable from 0 to 130 V.
- One current output, from 0 to 15 A, switchable on 3 phase sockets.
- One independent current output, adjustable from 0 to 1 A.
- Frequency generator: 40 - 400 Hz. • IEC 61850-8 communication interface.



## T 1000 PLUS - Secondary Injection Relay Test Set

- Multi-tasking test set designed for testing relays and transducers.
- Max current output: 250 A.
- Max AC voltage output: 250 V. Max DC voltage output: 300 V.
- T 1000-E Plus model with 500 A AC voltage outputs.
- Frequency generator: 15 ÷ 550 Hz.
- Phase angle shifter.
- Battery simulator 20 ÷ 260 V DC.
- Oscilloscope function for current and voltage.
- USB port - Microprocessor controlled.

## TD 1000 PLUS - Secondary Injection Relay Test Set

- Multi-tasking test set designed for testing relays and transducers.
- Max current output: 250 A.
- Max AC voltage output: 250 V. Max DC voltage output: 300 V.
- Two current outputs to test the differential relay.
- TD 1000 PLUS 15 Hz model with higher power at 15 Hz.
- Frequency generator: 15 ÷ 550 Hz.
- Phase angle shifter.
- Oscilloscope function for current and voltage.
- USB port - Microprocessor controlled.





# TESTING CIRCUIT BREAKER

After installation on site commissioning tests are conducted on circuit breakers to verify the readiness and proper functioning. Periodic tests are necessary due to the longevity of the circuit breaker and also to the unquestioned importance of the correct operation of the breaker during its lifetime. Breaker parameters like: open/close timing, dynamic and static measurement of the resistance of the main contacts, motion and speed of the same can be checked and compared with the value specified by the manufacturer.



## CBA 1000 - Circuit Breaker Analyzer and MicroOhmmeter

- Designed for the complete test of all circuit breakers.
- Built-in 200 A microOhmmeter - static and dynamic contact resistance measurement.
- Motion and speed analyzer.
- 6 main and 6 resistive contact inputs. • Up to 4 trip/close coil controls.
- 7 analog inputs. • 4 auxiliary timing inputs.
- Circuit Breaker test with two ends connected to ground (BSG option).
- Minimum Trip Coil Test.
- Analysis and result evaluation directly on the display.
- USB and RS232 port.



## CBA 2000 - HV Circuit Breaker Analyzer and MicroOhmmeter

- Designed for the complete test of all circuit breakers.
- Built-in 200 A microOhmmeter - static and dynamic contact resistance measurement.
- Motion and speed analyzer. Digital transducer for motion analysis.
- Up to 18 main and 18 resistive contact inputs.
- Up to 4 trip/close coil controls. • 10 analog inputs. • 12 auxiliary timing inputs.
- Circuit Breaker test with both sides connected to ground (BSG option).
- Minimum Trip Coil Test.
- Analysis and result evaluation directly on the display.
- USB and RS232 port.



## BSG - Safe Circuit Breaker Test with Both Sides Grounded Option for ISA Circuit Breaker Analyzer CBA 1000 and CBA 2000

(it can be applied to all kind of circuit breakers).

- Work in safe grounded location while testing.
- Save circuit breaker testing and analysis time.
- Preserve all timing and motion test integrity.
- The BSG 1000 allows the test of circuit breakers using Graphite Nozzle.

## GECC 3000/GECC 1500 - DC Voltage Power Supply Unit

- Powerful output up to 3.3 KW (GECC 3000).
- Powerful output up to 1.65 KW (GECC 1500).
- Lightweight: only 11.5 kg.
- Ripple free power supply.
- For testing circuit breaker, DC motors and protection system.



# TESTING TRANSFORMERS

Knowledge of the behavior of the principal electrical apparatus installed in a substation is mandatory and testing and maintenance are necessary to understand any inconvenience it may occur during normal and fault condition of the system. STS 5000 test equipment is the most accurate multifunction substation and maintenance system for current, voltage and power transformer. It becomes also a capacitance and Tan Delta diagnostic system with the optional module TD 5000. T 3000 substation and maintenance test set and T 2000 are designed to test the static equipment such as power and measuring transformers, ground grid network, line impedance.



## STS 5000/ STS 4000 / STS 3000 - Multifunction substation maintenance & commissioning test system for current, voltage and power transformers.\*

- Fully automatic.
- Primary injection testing capabilities: up to 800 A or up to 3000 A, with the optional module BUX 3000.
- Variable output frequency: 15 - 500 Hz.
- Power dissipation factor test with the optional module TD 5000 (V up to 12 kV).
- 2000 V AC high-pot test.
- USB and Ethernet interface for PC connection.
- TDMS software for test set control, results storage and analysis.

## STS 5000/ STS 4000 / STS 3000 & TD 5000 - Multifunction test system for current, voltage and power transformers. Capacitance and Tan Delta diagnostic system with the optional module TD5000.\*

- Tan Delta, capacitance, dissipation factor measurements and for exciting current test.
- Output voltage up to 12 k.
- Variable output frequency: 15 - 500 Hz.
- Compact and lightweight.
- TDMS software for test set control, results storage and analysis.

*\*For USA, only STS 3000 with the optional modules BUX 3000 and TD 5000 is available. STS family products are not available in Germany.*



## T 3000 & T 2000 - Substation Maintenance and Commissioning Test Equipment

- Multi function system for testing current, voltage and power transformers, all type of protection relays (T 3000 only), energy meters and transducers.
- Primary injection testing capabilities.
- 3000 V AC high-pot test.
- Generates up to 800 A (option up to 4000 A).
- Microhmmeter function (option): up to 400 A DC.
- RS232 interface for PC connection.
- Test results and settings are saved into local memory.
- Compact and lightweight: 34 kg ( T 3000); 31 kg (T 2000)



## KAM - Primary Current Injection Test System

- Designed for primary injection testing of protection relays and circuit breakers, for commissioning and revamping of substations and electrical network.
- High current output up to 7000 A.
- Powerful output up to 35 kVA.
- Modular design for easy transport.
- Heat runs.



# TESTING BATTERIES

Electrical power plants are normally equipped with batteries of different types and regular test and measurement of battery voltage according to international standard are requested in order to assure the standby power for relays, circuit breakers, measuring equipments and telephone exchanges.



## BTS 200 MKII - Battery Test System

- High power battery capacity test system.
- Designed to perform discharging cycle combining efficiency with portability.
- Discharging current up to 1300A with external loads.
- Graphical display showing test parameters, curves and results.
- Internal memory.
- Suitable for all battery types.
- Shunt and clamp connection to external current.
- Possibility to use the BTS 200 in connection with up to 9 external loads ELU200.
- Light and easy to carry, with handle and wheels.

## ELU 200 MKII - External Load for BTS 200 MKII

During testing and maintaining activities on battery system, this external current measurement unit can be connected to BTS 200 MKII when a higher load current is necessary. This extra load allows different configuration to set the discharging current at different voltage level.

- Resistive extra load for BTS 200 MKII.
- Different configurations allowed to set the discharging current at different voltage levels.
- Up to 9 external loads ELU 200 MKII can be connected to BTS 200 MKII.
- Interface: USB.



## SCAR 10 - Metal Oxide Surge Arrester Test Set

This MOV- metal oxide varistor test system is the perfect device to perform analysis and diagnostics on metal oxide arresters. It is supplied with a special current clip-on transformer designed for the measurement of current leakage.

- On-line diagnostic of metal oxide surge arresters.
- Third harmonic analysis of leakage current with compensation.
- Extensive field experience.
- Easy, fast and reliable diagnostic method.
- Safe lightweight equipment.
- Supplied with C 47-IS clip-on transformer specifically designed to measure leakage current losses in the presence of high electric and magnetic fields.

## BTS 100 - Battery Test System

This Battery test system is designed to test substation batteries and allows to perform discharging cycles.

- High power battery capacity test system.
- Discharging current up to 300 A.
- Suitable for all battery types.





# CONTINUOUS ON LINE DIAGNOSTICS AND FAULT LOCATOR SYSTEM

The purpose of the continuous on line diagnostics is to highlight incipient problems before these can cause power system outage with the goal of better handling maintenance intervention. In order to achieve this goal it is necessary to set up a continuous monitoring system. ISA has developed EDS – Expert Diagnostic System and CB Monitor system for the continuous monitoring of substation devices and TFS 2100E, Traveling Wave fault locator system, providing accurate fault location solution for transmission and distribution power lines.



## EDS - Expert diagnostic system for substation apparatus

EDS units are designed to continuously monitor the condition of:

- High Voltage and Medium Voltage Circuit Breakers
- Current and Voltage Transformers
- High Voltage Surge Arrestors (MOV's).

The EDS is easy to install and, once configured, operates continuously. EDS units are designed to operate reliably under extreme weather conditions and electrical interference found in normal substation operations. In particular:

- Modules mounted outdoor are IP 65 and designed to work over an extended temperature range (from - 40°C to + 85°C).
- Self-diagnostics continuously tracks the condition of the EDS and issues alerts if an abnormality is detected in the system.
- By the continuous monitoring of the key parameters, EDS detects malfunctions in early stage and issues prioritized alarms communicating abnormal conditions and guiding maintenance decisions.

## CB MONITOR - On line circuit breaker monitoring system

CB MONITOR for substation equipments is a cost-effective on line diagnostic system used to monitor MV and HV circuit breakers. CB MONITOR system can monitor up to 10 circuit breakers at the same time. The purpose of the Circuit Breaker Monitoring System is to highlight issues before these can cause an inefficiency in the system, thus allowing a far better management of condition based maintenance. CB MONITOR verifies continuously the following parameters:

- Auxiliary contacts opening and closing time;
- Auxiliary contacts bouncing times;
- SF6 Density trend;
- Temperature;
- Accumulated fault current during arcing time ( $I^2t$ );
- Open and close current profiles;
- Mechanism operating time;
- Battery voltage.

Then, the monitoring system through its software processes and manages the acquired data and automatically sends alarm messages to the central SCADA if thresholds are exceeded. The software can process and analyze the data and automatically can detect and report in details the origin of the problem (electrical, mechanical, aging or gas leakage), without the need of the operator's analysis.



## TFS 2100E - Traveling Wave Fault Locator System

- The most accurate overhead transmission and distribution line fault locator
- Accuracy: 50m typical, regardless the line length.
- The GPS synchronization is embedded into TDU 100E and the fault location is performed directly on the network map.
- Unaffected by fault resistance and suitable for all kind of power lines AC and DC.
- Automatic distance to fault calculation.
- Unlimited number of monitored lines.
- Non intrusive installation and easy to set up.
- Master Station software for distance to fault calculation and analysis.
- Internet, Modem and Point to Point connections available.

# TDMS SOFTWARE

TDMS is a powerful software package providing data management for acceptance and maintenance testing activities. Electrical apparatus data and test results are saved in the TDMS database for historical results analysis. TDMS software organizes test data and results for the majority of electrical apparatus tested with ISA test sets and related software.

TDMS software controls and provides data acquisition from all ISA Test:

- DRTS 66, DRTS 64, DRTS 34, DRTS 33, DRTS 6, DRTS 3 Plus - Relay and Energy meters test sets.
- STS 5000, STS 4000, STS 3000 and TD 5000 - CT, VT, PT and Tan delta measurement test sets
- T 3000 and T 2000, T 1000 Plus and TD 1000 Plus - Primary and Secondary injection test sets.
- CBA 2000 and CBA 1000 - Circuit Breaker analyzers.
- BTS 200, BTS 100 - Battery load units.

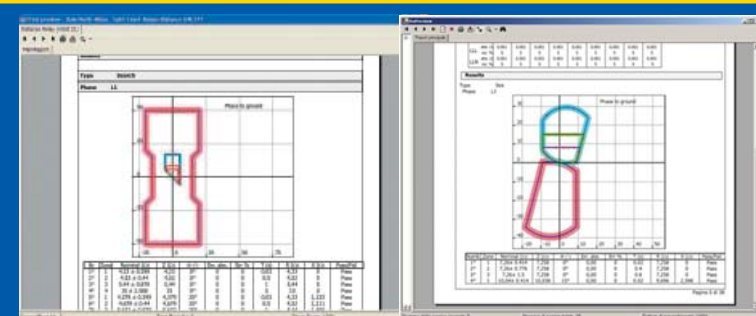


TDMS is the control platform to run all ISA test software. Test programs, calibration, firmware, software upgrade and languages are all managed by TDMS. TDMS is a powerful software package providing the following functions:

- TDMS controls all ISA Microprocessor based test equipment.
- TDMS allows to create test plans.
- TDMS Data Base organizes test data generated by ISA test sets.
- TDMS generates integrated test reports.
- TDMS performs statistics and trending.

**TDMS software** is a powerful database. It allows to create an electrical network with substations, feeders and the majority of electrical apparatus, such as:

- Relays
- Power transformers
- Energy Meters
- Power Quality Meters
- Instrument transformers
- Circuit Breakers
- Transducers
- Ground Grids



## TDMS Report Editor

TDMS has a built-in Report Editor that allows to generate professional test report for a single test object, for a group of tested devices or for an entire substation.

It can create customized report or use standard forms.

TDMS Tests report can be exported in MS Office (Word and Excel), PDF or RTF formats.